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Novel liposomes for Alzheimer's disease treatment

Mário Fernandes[1], Luana Magalhães[1], Ivo Lopes[1], José Teixeira[2], Cláudia Botelho[2], M.P. Sárria[3] and Andreia C Gomes[1,*]

[1] Centre of Molecular and Environmental Biology (CBMA), Universidade do Minho, Campus de Gualtar, 4710-057, Braga, Portugal; [2]Centre of Biological Engeneering (CEB), Universidade do Minho, Campus de Gualtar, 4710-057, Braga, Portugal; [3]International Iberian Nanotechnology Laboratory (INL), 4715-330, Braga, Portugal
** agomes@bio.uminho.pt*

Alzheimer's disease is one of the most debilitating neurological diseases, afflicting an ever-increasing number of a majorly elderly population worldwide[1]. Curcumin is a phytochemical which has been described to aid in the neuroprotection of the brain against oxidative stress insults and to reduce amyloid-β accumulation in the brain afflicted by Alzheimer's disease[2]. However, its solubility in human blood and its pharmacokinetics is very unfavorable, leading to rapid elimination from the blood stream. Moreover, it is poorly absorbed by the intestines, limiting oral administration.
The use of liposomes to encapsulate and carry curcumin to the brain is already being proposed for therapy. We developed a novel type of liposomes, with a unique mixture of phospholipids mimicking cellular components, that can encapsulate curcumin in a highly efficient manner. These liposomes have an adequate size to cross the human blood brain barrier and are not cytotoxic to fibroblast and neural cell lines. Moreover, curcumin is incorporated in these cells and has a neuroprotective effect [3], reducing ROS production and increasing cell viability upon incubation with an oxidative stress inducer. Furthermore, these liposomes do not show any *in vivo* toxicity in a zebrafish embryotoxicity model, with curcumin being incorporated without side effects. The functionality of zebrafish blood brain barrier (BBB), which is similar in structure to the human one, is fully obtained 3 days after fertilization, and provides valuable information[4]. With this system we can diminuish the production of ROS, and presumably slow the progression and alleviate the symptoms of Alzheimer's disease.

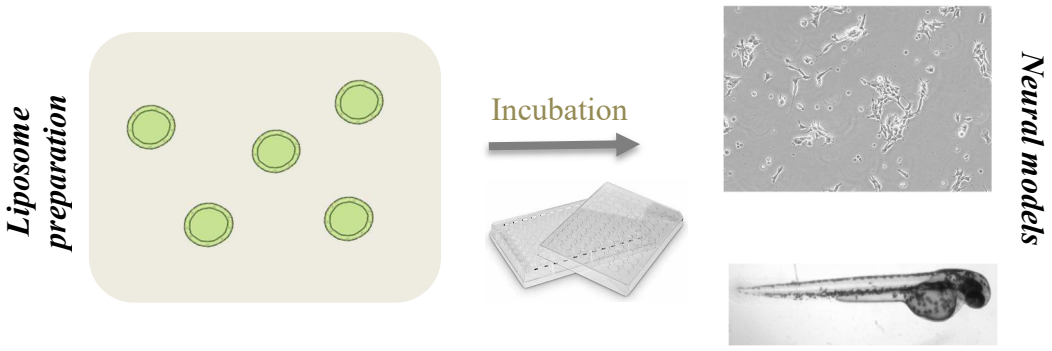

Figure 1: Schematic overview of the production and validation of the novel mimetic liposomes in models of neural oxidative insult.

Acknowledgements: This work was supported by the strategic programme UID/BIA/04050/2019, funded by national funds through the FCT IP, and project FUN2CYT: Harnessing the potential for biomedical applications of pleiotropic cytokines LIF and oncostatin M (PTDC/BTM-MAT/30568/2017, POCI-01-0145-FEDER-030568) supported by POCI through FEDER and FCT IP.

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